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10/706,757	11/12/2003	Stephen Y. Chou	14002-7	7832
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SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/706,757

Applicant(s)

CHOU ET AL.

Examiner

Binh X. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8,10-17,19 and 30-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,8,10-17,19 and 30-37 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 35 is objected to because of the following informalities: In line 2 of claim 35 the term "the photocurable" appears to be a typo error for --the photocurable--.

Appropriate correction is required.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-4, 7-9, 15-17 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 14, 19 of U.S. Patent No. 5,772,905 in view of Napoli et al. (US 4,731,155).

The claims of the present application differ from the claim of US 5,772,905 by further specifying the polymeric composition capable of being deformed by said mold at a temperature of less than 200 °C. However, the US patent 5,772,905 clearly discloses the use the thermal plastic polymer which is capable of being deformed by the mold.

Napoli teaches to use thermal plastic polymer comprises polymethyl methacrylate (PMMA), or homopolymers, copolymers of styrene, vinyl chloride, ester of acrylic acid or methacrylic acid, which is capable of being deformed at a temperature below 200 °C (col. 5-6). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify US Patent 5,772,905 in view of Napoli by using thermal plastic polymer which is capable of being deformed at a temperature less than 200 °C because equivalent and substitution of one for the other would produce an expected result.

Further, reducing the process temperature will reduce the energy cost.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-2, 16-17, 19, 30-31, 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haisma (Mold-assisted nano-lithography: A process for reliable pattern replication, American Vacuum Society) in view of Napoli et al. (US 4,731,155).

Respect to claims 1 and 30, Haisma discloses a nano-lithography process comprising the step of:

obtaining a mold of a material, which mold is hard relative to the nanoresist film, the nanoresist film comprising a polymeric composition capable of being deformed, the composition is selected from the group of UV-curable polymer (read on "photocurable polymeric composition; See Fig 2, page 4124);

the mold having first and second protruding features spaced apart from each other and a recess formed thereby, the first and second features and the recess having a shape forming a mold pattern and providing at least one mold pattern lateral dimension below 100 nm (page 4124 col. 1, Fig 1, Fig 2);

urging the mold into the film under a molding pressure, wherein the thickness of the nanoresist film under the protruding features of the mold being reduced thereby forming the mold pattern in the nanoresist film, the mold pattern comprising a plurality of structures having at least one dimension less than 200 nm (Fig 2b-2c, page 4125, col. 2);

removing the mold from the film, the polymeric composition retaining said plurality of structure (Fig 2d);

removing from the film the read of reduced thickness (thickness label "r"), thereby exposing portion of the surface of the substrate such that the exposed portions of the substrate substantially replicate the mold pattern and have at least one lateral dimension which is less than 100 nm (Fig 2e, page 4124-4125).

Haisma does not explicitly disclose the polymeric composition is capable of being deformed at a temperature of less than 200 °C. However, Haisma clearly discloses the polymeric composition is capable of being deformed.

Napoli teaches to use thermal plastic polymer comprises polymethyl methacrylate (PMMA), or homopolymers, copolymers of styrene, vinyl chloride, ester of acrylic acid or methacrylic acid, which is capable of being deformed at a temperature below 200 °C (col. 5-6). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Haisma in view of Napoli by using thermal plastic polymer which is capable of being deformed at a temperature less than 200 °C because equivalent and substitution of one for the other would produce an expected result. Further, reducing the process temperature will reduce the energy cost.

Respect to claim 2, Haisma discloses the film comprises a homopolymer, block polymer (page 4124). Respect to claims and 31, Haisma discloses the polymer is a photocurable polymer (i.e. UV-cured polymer). Respect to claim 16, Haisma discloses the nano-resist comprises a mold release agent, monomers, additive (i.e. photoinitiator) (col. 1 page 4125). Respect to claim 17, Haisma discloses the nano-imprint resist

comprise up to 100 weight percent of polymeric composition. Respect to claim 19, Haisma discloses the structures have a dimension of 37.5 nm (page 4126, col. 1, read on "sub-50 nanometer").

Respect to claims 34-35, Haisma discloses the polymeric composition comprises a UV-cure polymer and it is harden by ultraviolet exposure (Fig 2).

7. Claims 3, 10-12, 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haisma in view of Napoli and further in view of Harmening (Molding of Three Dimensional Microstructures by the Liga Process).

Respect to claim 3, Haisma fails to disclose the polymeric composition comprises poly(methyl methacrylate) or other polymer compound as listed by applicants.

Harmening discloses a polymer compound comprise of poly(methyl methacrylate) (PMMA) as the material for the resist layer (page 202-203). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Haisma in view of Harmening by using PMMA because this compound exhibit favorable resist properties (See page 203 col. 2). Respect to claim 15, Harmening discloses the polymeric composition comprises approximately 70 weight percent of monomer (page 204, col. 1).

Respect to claims 10-12, 14 both Haisma and Harmening fails to disclose the capable curing time, the viscosity, or capable crosslinking time of the polymer material on exposure to radiation. However, Harmening clearly teaches to use a photo-curable polymer capable of crosslinking and having the identical chemical formula with applicant's polymer compound (i.e. PMMA). Viscosity and capable curing time is a

property of the material. According to the MPEP 2112.01, Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present.

8. Claims 4, 13, 32-33, 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haisma and Napoli in view of Yamamura et al. (US 5,981,616).

Respect to claims 4 and 13, Haisma fails to disclose the polymeric composition comprise an oligomer, the oligomer comprises epoxy resin or polysiloxane. In a photo-curable composition, Yamamura teaches the polymeric composition comprises an oligomer, the oligomer comprises epoxy resin or polysiloxane (col. 3 lines 34-36, col. 16 lines 10-15). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Haisma and Napoli in view Yamamura by using a polymeric composition comprises oligomer including epoxy resin or polysiloxane because this composition provide a cured products having excellent mechanical strength and minimize shrinkage (abstract).

Respect to claim 32, Haisma and Napoli fails to disclose the composition is a thermosettable polymeric composition. Yamamura discloses the composition is a thermosettable polymeric composition (heat-curable; See col. 18 lines 1-30). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Haisma and Napoli in view of Yamamura by using a thermosettable polymer because it will improve strength and heat resistance of the surface.

Respect to claim 33, Haisma and Napoli fails to disclose the composition is a mixture a photocurable composition and a thermosettable polymeric composition. However, Haisma clearly discloses the composition comprises a UV-cured polymer (i.e. read photocurable). Yamamura discloses the composition comprises a mixture of photocurable composition (e.g. photo-initiator) and thermosettable polymeric composition (e.g. epoxy compound; abstract Note: epoxy is a thermosettable; See prior art made of record). It would have been obvious to one having ordinary skill in the art, at the time of invention to use a mixture of photocurable and thermosettable polymer because this mixture reducing fabricating time and providing cured products having excellent mechanical strength.

Respect to claim 36, Yamamura discloses using thermal treatment to harden the thermosettable polymer (i.e. heat curable, See col. 18). Respect to claim 37, Haisma discloses to use ultraviolet exposure on the photocurable polymer. Yamamura also discloses to use UV light to cure the polymer composition (col. 20 lines 8-15, lines 55-65).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haisma in view of Napoli and further in view of Ito et al. (US 2002/0102490 A1).

Respect to claim 1, Haisma fails to disclose the polymeric composition comprise a monomer, wherein the monomer comprises a C₈-C₂₀ alkyl methacrylate, fluorinated alkyl (meth)acrylate monomer, or any combination thereof. However, Haisma clearly teaches the polymeric composition comprises monomer. Ito teaches to polymeric composition comprise monomer, wherein the monomer comprise alkyl methacrylate,

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fluorinated alkyl methacrylates (paragraph 0039). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Haisma in view of Ito by using the monomer comprise alkyl methacrylate, fluorinated alkyl methacrylates because it will enhance the performance of the photoresist layer.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haisma in view of Napoli as applied to claim 30 above, and further in view of Yoshinada et al. (US 5,141,785).

Respect to claim 8, Haisma and Napoli fails to disclose the polymeric composition is capable of deformed at a temperature of less than about 100 °C. However, Napoli clearly teaches is capable of being deform at a temperature between 100-250 °C (col. 2 lines 52-60). In a method for forming a pattern, Yoshinada discloses the temperature is a result effective variable. Yoshinada further discloses to set the temperature not lower than the glass transition temperature in order to form a pattern using a stamper (col. 2 lines 31-35). Yoshinada further discloses the vary the temperature between 35-180 °C (See Table in col. 62; read on applicant's range of below 100 °C). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to perform routine experiment in order to determine the optimal temperature that the polymer is capable of deforming (i.e. the temperature in which the polymer capable of forming a pattern using a stamper).

Allowable Subject Matter

11. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The cited prior arts fail to disclose or suggest the polymeric composition further comprises a crosslinker, said crosslinker comprising divinyl benzene, trimethylolpropane triacrylate, or any combination thereof in combination with all other limitations in the claims.

Response to Arguments

13. Respect to the double patenting rejection, the applicant argue that "Napoli discloses embossing with nickel masters containing uniform rectangular grating pattern of 2, 0.85 and 0.7 micrometer wide peaks and valleys having vertical sides, dimension that are much larger than 200 nm". The examiner disagrees with this argument. First, this argument is not commensurate the claims of the claims. The claims of the present invention require "at least one lateral dimension which is less than 200 nm" (emphasis added). The claims of the present invention do not require all of the lateral dimensions less than 200 nm. Second, US 5.772,905 clearly shows at least one lateral dimension which less than 200 nm.

Respect to the double patenting rejection, the applicant further argues, "The Office alleges that 'US Patent 5,772,905, clearly disclose the use [of] the thermal plastic polymer which capable of being deformed by the mold.' Office action of March 9, 2006,

page 4 lines 28-29. This is improper. The double patenting rejection must be based on the claims of U.S Patent 5,772,905, not its disclosure". This argument is not persuasive. Claim 1 of US 5,772,905 discloses the film is being deformed under the pressure of the mold (col. 7 lines 35-41). Claim 2 of US 5,772,905 discloses the films comprises thermoplastic polymer (col. 7 lines 50-51). The term thermoplastic is defined as "a material that is plastic or deformable" (See Wikipedia prior art made of record). With respect to the double patenting rejection, the examiner clearly bases on the claims of US 5,772,905, not its disclosure as alleged by applicants.

Respect to the previous 35 USC 102(b) rejection, the applicant's argument (page 11 of the remark) is persuasive. Thus, the examiner withdraws the previous ground of rejection. However, upon further consideration, the examiner provides a new ground of rejection (i.e. 35 USC 103(a)) as discussed above.

In previous office action page 8 lines 3-4, the examiner make a typo error when asserts that "Haisma" discloses the polymeric composition comprises approximately 70 weight percent monomer (page 204, col. 1). The cited passage is a passage of Harmening, not Haisma. The examiner corrected this typo error in the office action.

The applicants further argue that Harmening teaches the resist layers were produced by radical polymerization of mixture contains 30 % of polymethyl methacrylate and 70% methyl methacrylate monomer. The resulting layer was then molded. According to applicants "the molding step occurs after the methyl methacrylate has been polymerized to form the resist layer. Consequently, the resist layer that is molded contained a mixture of polymethyl methacrylates with differing molecular weight, not a

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monomer containing polymer". This argument is not persuasive. First, there is no limitation in the claims indicating that all the steps must be performed in a recited order. Second, in claim 15, the applicant did not claim the specific molecular weight as argued. Instead the applicant claims "said photocurable polymeric composition comprises up to about 90 weight percent monomer". Harmening's teaching of using 70% monomer for the resist layer certainly reads on applicant's limitation "up to about 90% weight percent monomer".

The applicants further argue that Harmening discloses forming patterns that have a dimension of below 10 micrometers and up to 340 micrometers (in contrast with the applicant's dimension which is less than 200 nm). According to the applicant "Harmening is not directed to nanoimprinting, but to a technology that produces much larger structures than the applicant's invention". This argument is not commensurate with the scope of the claims. The claims of the present invention require "at least one lateral dimension which is less than 200 nm" (emphasis added). The claims of the present invention do not require all of the lateral dimension which is less than 200 nm. Further, as pointed out by the applicant Harmening discloses a dimension below 10 micrometers. The examiner interprets below 10 micrometers to include the range from greater than zero micrometer and less than 10 micrometer (10 micrometer = 10,000 nm). This range certainly overlaps with the applicant's less than 200 nm.

The applicants further argue, "Yamamura relates generally to the field of washable dry erase coloring compositions for drawing and coloring purposes. See, Yamamura, col. 1 lines 5-7. It is not from the same field of endeavor, nor does it

address the same problem as applicants' invention". The examiner cannot find the support for the passage cited by applicant. In column 1 lines 5-7, Yamamura wrote, "The present invention relates to a photo-curable resin composition used for photo-fabrication of three-dimension objects". Thus, the examiner still maintains that Yamamura is analogous art with applicants' invention.

Respect to claim 6, the applicant's argument is persuasive. Thus, the examiner withdraws the previous ground of rejection.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wikipedia, <http://en.wikipedia.org/wiki/Thermoplastic> defines thermoplastic is a material that is plastic or deformable.

Wikipedia, <http://en.wikipedia.org/wiki/Epoxy> discloses that epoxy is a thermosetting polymer.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Binh Tran

Binh X. Tran